Original Article

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Surgical Experience and Results of Retzius Sparing Robotic Assisted Laparoscopic Radical Prostatectomy: First Report in Thailand

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Abstract:

Objective: To evaluate the outcomes and safety of the surgical technique Retzius-sparing robot-assisted laparoscopic radical prostatectomy (RS-RALRP), with prostatic cancer; the first report in Thailand.

Material and Methods: The authors conducted a retrospective analysis from the medical records of 100 patients who underwent RS-RALRP by a single surgeon; from 1st January 2021 until 31st May 2023, at Rajavithi Hospital. The authors analyzed demographic data, clinical staging, Gleason grade group, operative time, pathologic staging, positive surgical margin rate; postoperative continence recovery and postoperative complications.

Results: The median age was 71.34±6.84 years: mean total PSA was 17.16±17.55 ng/ml; with the majority in clinical T1 and T2. The mean operative time was 221.7±51.93 minutes, and the mean estimated blood loss was 312.30±264.55 ml. Of all patients, 88% did not require blood transfusion. The complication rate was 8%. The pathologic stages pT2 and pT3 or greater were 62% and 38%, respectively. Positive surgical margins (PSM) pT2 and pT3 were 14.5% and 63.2%. The postoperative continence recovery after RS-RALRP were 83%, 95%, 97%,100% and 100%: at 1, 3, 6, 9 and 12 months postoperatively, respectively.

Conclusion: RS-RALRP has a potential to become the new standard for prostate cancer treatment, with improved early continence and equivalent oncologic efficacy. The limitations of this study are the small number of population, which require prospective multicenter studies.

Keywords: prostate cancer, Retzius-sparing, robotic-assisted surgery, RS-RALRP, RS-RARP

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Introduction

Prostate cancer is the most common non-dermatologic cancer among men in Western countries, with an estimated 191,930 new cases diagnosed in America[1]. The annual incidence in Thailand is 7.2/100,000 of the population, and the mortality is 3.7/100,000 of the population[2]. Although Radical Prostatectomy (RP) remains the gold standard treatment of localized prostate cancer[3], at the 12th month after RP, urinary incontinence rates range from 4% to 31%[4], which affects quality of life and psychosocial status of the patients[5]. Urinary incontinence caused by fear of urine leaking, smell of urine, and use of diapers which can be humiliating, may cause shunning of social contact in many men[5]. In fact, urinary incontinence has been rated as a more bothersome outcome than erectile dysfunction, because it can lead to significant anxiety and depression. In the present day, the exact mechanism that maintains continence after RP it not known. Multiple modified surgical techniques have been developed to improve urinary continence, such as periurethral suspension, bladder neck (BN) preservation, preservation of the puboprostatic ligaments, nerve-sparing, dorsal vein complex preservation, and urethral length preservation. All modified techniques were created to maintain, or restore, as much as possible, pelvic anatomy. As of 2010, Galfano et al. have described the Retzius-sparing robot-assisted laparoscopic radical prostatectomy (RS-RALRP). The technique aims for maximal preservation of the pelvic fascial anatomy without the need for reconstruction, which has demonstrated to improve short-term urinary continence. Therefore, this present study aimed to demonstrate the reproducibility of the RS-RALRP technique, its short-term oncologic outcomes, functional efficacy, and complication rate in the initial 100 cases of RS-RALRP in a cancer in Thailand.

Material and Methods

Patient selection and data collection

The first 100 RS-RARP cases performed by a single surgical team in the Minimally Invasive Surgery (MIS)-Urology Department of Rajavithi Hospital from January 1st, 2021 until May 31st, 2023, were retrospectively reviewed. The surgeon had had experience in 250 laparoscopic radical prostatectomy procedures before commencing RS-RALRP. All patients presented with localized and locally advanced prostate cancer. All RS-RALRP procedures were performed with 4-arm of the DaVinci Xi Surgical system. Exclusion criteria included severe cardiopulmonary disease, severe coagulopathy and metastasis diseases. This study was approved by the Rajavithi Hospital Ethics Committee. In this study data on age, body mass index, prostate specific antigen (PSA) before biopsy, Gleason Grade Group, clinical staging obtained, and postoperative data; including the Gleason Grade Group, extracapsular extension, seminal vesicle invasion, positive surgical margin, pathological T stage, pathological N stage in dissected cases with lymph node dissection, operative time, estimated blood loss and Clavien-Dindo classifications (3 or greater) for all patients was included. The study endpoint was continence recovery duration and rate. Patient treatment was conducted according to the usual methods of Rajavithi Hospital. The Foley catheter was removed 8 days after surgery. Urinary incontinence, which was assessed starting 1 month post-operatively, then monthly until 6 months, was recorded as the binary outcome of continence and incontinence. The continence criterion was defined as the use of less than 1 safety liner per day. PSA follow-up was performed from 4 weeks until 6 months after surgery. The results of erectile dysfunction (ED) are not summarized in this study, because most patients presented with ED before surgery. All statistical analyses were undertaken with IBM SPSS, version 20.

Surgical Technique

1. Robotic set-up and port placement

The trocar position was designed, as shown in Figure 1, for the DaVinci Xi Platform. The first trocar was performed by an open technique at the supraumbilical area and inserting at the other trocar under laparoscopic vision, by the 30-degree lens.

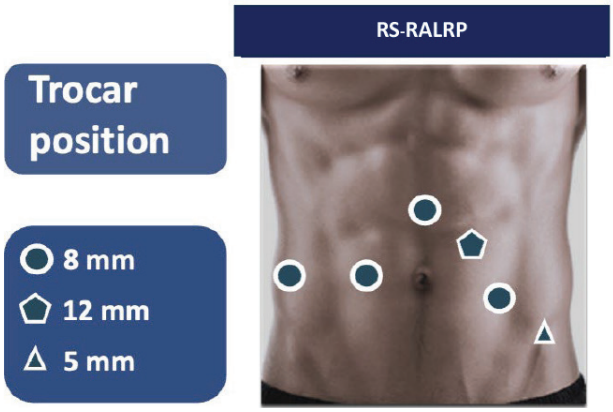

Figure 1 The Retzius-sparing robot-assisted laparoscopic radical prostatectomy (RS-RALRP) trocar position was designed for the DaVinci Xi Platform

2. Incision of peritoneum, vas deferens and seminal vesicles dissection, posterior dissection

First, an inverted U incision at the anterior surface of the Douglas space was created. Seminal vesicles and vas deferens were then dissected and incised. The Seminal vesicles and vas deferens were sutured together for Prograsp forceps to lift both structures to exposure posterior aspect. Denonvillier's fascia was incised and dissected on the posterolateral surface of the prostate in an antegrade direction; reaching the prostatic apex. This step can select a layer of the neurovascular bundle (NVB) and maintain a complete plane (extrafascial, interfacial and intrafascial NVB preservation) as shown in Figure 2.

3. Lateral Pedicles and nerve-sparing

Dissection and control of the pedicel by a 3-mm and 10-mm vascular clips. Avoid coagulation at this step to prevent NVB from thermal injury, as shown in Figure 3.

4. Bladder neck, apical and anterior, and urethral dissection

The bladder neck was dissected from both lateral sides until the cone shape of the bladder neck was seen; as shown in Figure 4. Incision of the bladder neck at the

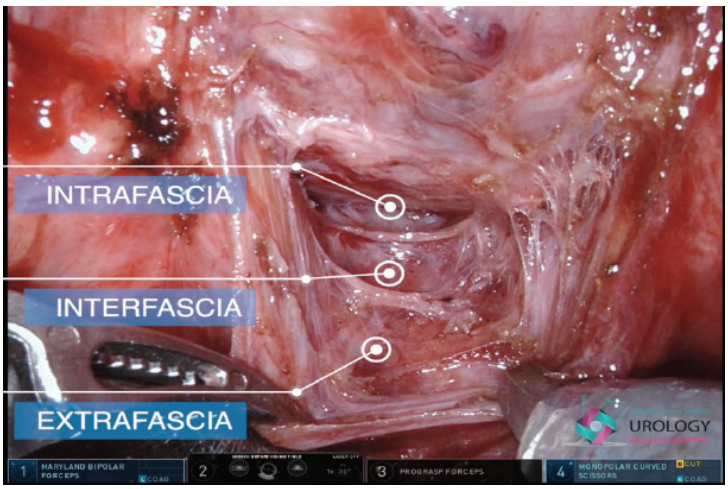

Figure 2 Selecting a layer of the neurovascular bundle (NVB) and maintain a complete plane (extrafascial, interfacial and intrafascial NVB preservation)

prostatovesical junction and dissection of the anterior surface of the prostate that is under the bladder apron until its apex. The incision of the urethra to complete radical prostatectomy is shown in Figure 5.

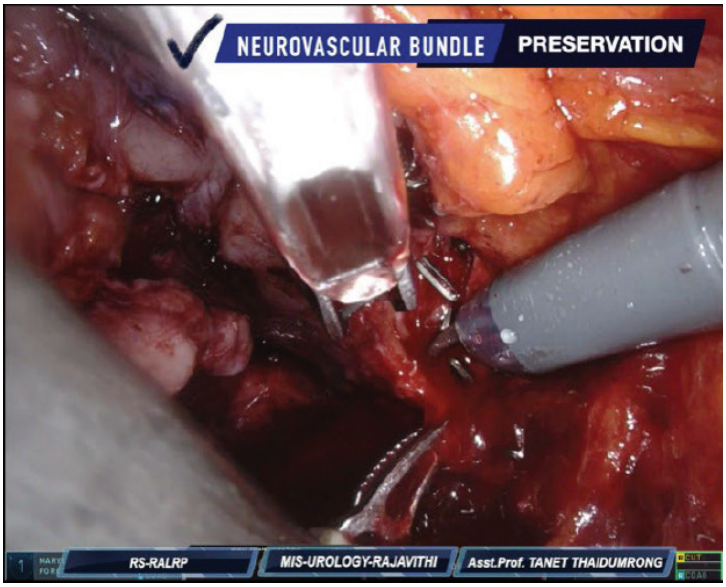

Figure 3 Selecting a layer of the neurovascular bundle (NVB) and maintain a complete plane (extrafascial, interfacial and intrafascial NVB preservation)

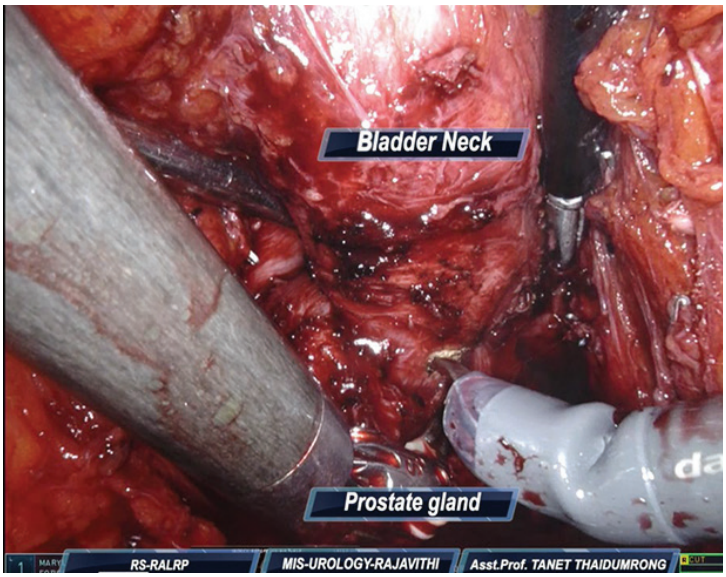

Figure 4 The bladder neck is dissected from both lateral sides, until the cone shape of the bladder neck

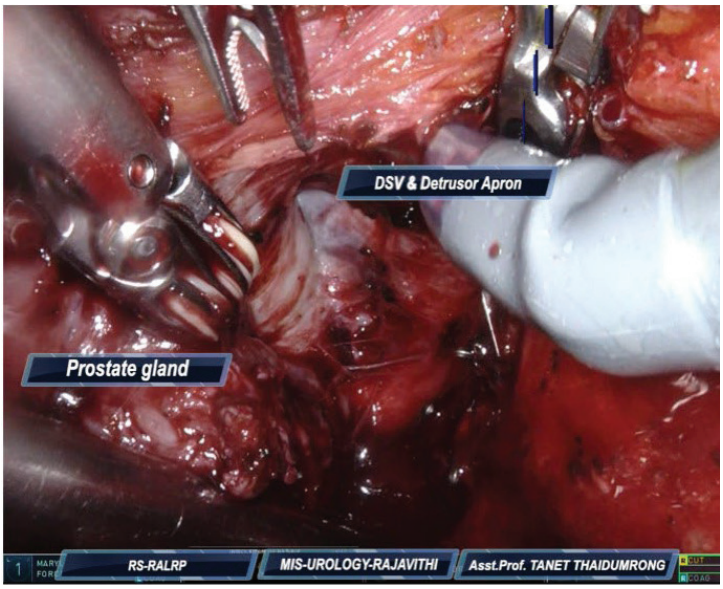

Figure 5 Dissecting the prostate's anterior surface under the bladder apron until the apex

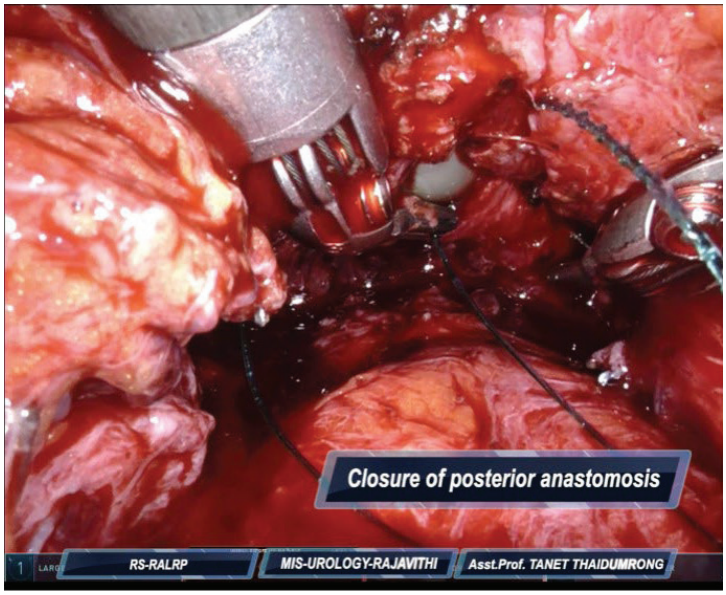

Figure 6 Inserting a Foley catheter into the bladder and closure of the posterior aspect of anastomosis

5. Vesicourethral anastomosis

The needle drivers are placed in the first and fourth arm, leaving the prograsp forceps in the third arm for exposure of the anastomosis field**.** Anastomosis barb suture was started at 1 o'clock until 3 o'clock, with the other suture started at 12 o'clock until 9 o'clock. A Foley catheter was inserted into the bladder and the posterior aspect of the anastomosis was closed until obtaining complete closure.

Test for anastomosis leakage was done with 150 ml of normal saline instilled into the bladder; as shown in Figure 6.

Supplement video surgical technique of RS-RALRP: https://drive.google.com/file/d/1kt7ur67rd3JisswuPKL826ZE5JmkCUOc/view?usp=sharing

Results

Preoperative clinical data: The median age was 71.34±6.84 years, with the mean total PSA being 17.16±17.55 ng/ml. The ASA classification for most patients was class 2 approximately (88%). The percentage of patients with clinical T1, T2, and T3 stages were 51, 39, and 10, respectively. The percentage of the Gleason grade group at biopsies 1, 2, 3, 4 and 5 were 31, 26, 14, 19 and 10, respectively: as shown in Table 1.

Table 1 Preoperative clinical data of Retzius-sparing robot-assisted laparoscopic radical prostatectomy (RS-RALRP) in 100 patients

Demographic data	RS-RALRP
Median age (years)	71.34±6.84
Mean±S.D. total PSA (ng/ml)	17.16±17.55
Mean±S.D. Hct. (%)	42.10±4.27
No. American Society of Anesthesiologists classification (%)	
1	5
2	88
3	7
4	0
5	0
No. Gleason Grade Group at biopsy (%)	
1	31
2	26
3	14
4	19
5	10
Clinical T stage (%)	
T1	51
T2	39
T3	10

S.D.=standard deviation, PSA=Prostate specific antigen, Hct=hematocrit, No.=number

Perioperative clinical data: the mean operative time was 221.7±51.93 minutes, and the mean estimated blood loss was 312.30±264.55 ml. Eighty-eight percent of patients did not require blood transfusion. The length of stay was 7.32±1.74 days, while post-operative cystogram testing showed no leakage at 5.09±1.58 days. The complication rate was 8%. Considering mean operative time the learning curve of RS-RALRP was estimated at 81-100 cases as shown in Table 2.

Table 2 The learning curve data of Retzius-sparing robot-assisted laparoscopic radical prostatectomy (RS-RALRP) in 100 patients

Order of RS-RALRP	Mean±S.D. operative time (min)	p-value
1-20	360±60.9	0.189
21-40	332±69.7	0.119
41-60	332±46.4	0.117
61-80	354±83.5	0.800
81-100	305±41.4	0.002

S.D.=standard deviation

Postoperative clinical data: the pathologic stages pT2 and pT3 or greater were 62%, and 38%, respectively, while pathological Gleason Grade Groups 1, 2, 3, 4, and 5 were 12%, 21%, 31%, 12%, and 24%, respectively. Positive surgical margins (PSM) pT2 and pT3 were 14.5%, and 63.2% and the most PSM area was an anterior lobe of the prostate. The postoperative continence recovery after RS-RALRP was 83%, 95%, 97%, 100%, and 100% at 1, 3, 6, 9, and 12 months postoperatively, respectively: as shown in Table 3.

Table 3 Postoperative outcomes of Retzius-sparing robot-assisted laparoscopic radical prostatectomy (RS-RALRP) in 100 patients

Clinical data	RS-RALRP
Mean±S.D. operative time (mins)	221.7±51.93
Mean±S.D. Hct. (%)	37.07±3.67
Mean±S.D. estimated blood loss (ml)	312.30±264.55
No. transfusion (%)	
No	88
Yes	12
Mean±S.D. length of stay (days)	7.32±1.74
Mean±S.D. post-operative ambulation (days)	1.28±0.49
Mean±S.D. post-operative meal (days)	1.62±0.58
Mean±S.D. no leakage at post-operative cystogram (days)	5.09±1.58
No. Clavien-Dindo classification (%)	
No complication	92
1	3
2	2
3	2
4	1
No. pathological Gleason Grade Group (%)	
1	12
2	21
3	31
4	12
5	24
No. pathological T stage (%)	
T2	62
T3 or greater	38
No. pathological N stage (%)	
pN0	68
pN1	2
Not perform.	30
No. positive surgical margin (%)	
pT2	14.5
pT3 or greater	63.2
No. area of positive margin (%)	
Anterior lobe	37
Posterior lobe	22
Lateral lobe	4
Apex lobe	22
Bladder neck	15
No. post-operative continence (%)	
1 month	83
3 months	95
6 months	97
9 months	100
12 months	100

S.D.=standard deviation, Hct=Hematocrit, No.=number

Discussion

The minimally invasive surgery in prostatectomy was developed many years ago from laparoscopy to robotic surgery with the aim to reduce destruction related to important structures for male continence function. Nowadays, the exact mechanism of male continence after radical prostatectomy is not clearly known; however, all important structures in the pelvis, while performing RS-RALRP, should be preserved. The RS-RALRP technique can preserve the bladder neck, the urethral striated sphincter, the bladder apron, the dorsal vein complex, the puboprostatic ligament, the neurovascular bundle and the median and the medial umbilical ligament, which play important roles in continence function in males after radical prostatectomy. Every operation has its own goal; especially prostatectomy, which also has a trifecta as cancer-free, continent and potency. This present study showed that the mean operative time was 221.7±51.93 minutes for a single surgical team, with the step-to-pass learning curve. The mean length of stay was 7.32±1.74 days. Because most patients were referred from far provinces, they need to stay in the hospital until complete removal of all catheters. Estimated blood loss was 312.30±264.55 ml, however, the transfusion rate was only 12%. RS-RALRP is less complicated because most patients in this present study were complication free, as shown by the Clavien-Dindo classification. Umari et al.[6] published perioperative outcomes of RS-RALRP in 500 patients; wherein, the mean operative time was 149±35 minutes and the mean estimated blood loss as 206.81±124 ml. The length of stay was 2.06±0.64 days, and the overall complication rate was 15%. Lee et al.[7] made a comparison of 609 patients, between RS-RALRP and Standard- robot-assisted laparoscopic radical prostatectomy (S-RALRP). In their study, the mean operative time was 149±41 minutes in the RS-RALRP group and 194±44 minutes in the S-RARP group. The operative time was significantly lower in the RS-RARP group, however, the mean estimated blood loss, the length of stay, and the overall complications were not different between groups.

Galfano et al. studied patient recovery factors after prostatectomy as to its various postoperative factors, but incontinence is known to lower patient quality of life[8]. In this current study continence recovery after RS-RALRP was 83%, 95%, 97%, 100%, and 100% at 1, 3, 6, 9, and 12 months postoperatively, respectively. Chang et al. reported continence recovery after RS-RALRP as 73.3%, 91.0%, 94.2%, 97.7%, and 100% at 1, 3, 6, 9, and 12 months postoperatively, respectively[9]. Galfano et al. report continence outcomes from the initial 100 patients; wherein, about 90% had catheter removal within 7 days after, and this increased to 96% at 1 year[8]. Dalela et al. published a randomized, controlled trial that demonstrated RS-RALRP versus S-RALRP continence rates at 1 week after catheter removal at 71% versus 48%, respectively[10]. Lee et al. also published RS-RARP in 1,863 patients at 1 month postoperatively, the continence recovery rate in S-RARP and RS-RARP cases was 9.0% and 45%, respectively. Additionally, by the sixth month postoperatively, continence was recovered in 77% and 98% of the patients in the S-RALRP and RS-RALRP groups, respectively[7]. The meta-analysis from 14 studies involving 3,129 participants showed postoperative continence in the RS-RALRP group at 1 month (odds ratio (OR)=5.72, 95% confidence interval (CI): 3.56–9.19, p-value<0.01), 3 months (OR=6.44, 95% CI: 4.50–9.22, p-value<0.01), 6 months (OR=8.68, 95% CI: 4.01–18.82, p-value<0.01), and 12 months (OR=2.37, 95% CI: 1.20–4.70, p-value=0.01). This was significantly better than that in the S-RALRP group[11]. RS-RALRP is a novel surgical approach with better urinary continence recovery in the first few months compared with S-RALRP[14], and this superiority could be maintained for 1 year[12]. The

continence function affects the quality of life in post-radical prostatectomy patients and RS-RALRP provides better outcomes in that aspect after surgery.

For the oncologic outcomes in the RS-RALRP group, a systematic review and meta-analysis of four RCTs as well as six prospective observational studies were included in this review. The meta-analysis revealed that PSM rates in ≤pT2 tumors were statistically significantly higher, following RS-RARP as compared with S-RARP (risk ratio (RR)=1.39; 95% CI=1.01-1.91). PSM rates in ≥pT3 tumors tended to be higher following RS-RALRP (RR=1.36; 95% CI=0.74-2.50); although statistical significance was not reached[13]. Galfano et al.[8] found that PSM decreased from 22% in the first 100 patients versus 9% in the second 100 patients, with the majority of the PSMs at the apex. In this present study, the PSMs showed 14.5% in the pT2 group and 63.2% in pT3 or greater. The risk of PSM in this author's study may be from under staging, because not all cases performed MRI before surgery in addition to the Gleason grade group showing the worst of the Gleason grade group between preoperative and postoperative results. The most positive margin area is the prostate's anterior lobe, which must be of more concern in cases of the tumor location being at the anterior lobe, and extraprostatic extension from MRI of the prostate. Menon et al. published no significant difference in PSM rates or biochemical recurrence-free survival; demonstrating that RS-RALRP is likely oncologically equivalent to S-RALRP[14].

For sexual outcomes, although RS-RALRP, theoretically, the preservation of the DVC and pudendal arteries, combined with complete intrafascial nerve-sparing, may result in better sexual function outcomes. Menon et al.[14] found no significant differences between RS-RALRP and S-RARP in the potency rates or percentage of men regaining a Sexual Health Inventory for Men score greater than 17 at 1 year. Egan et al.[15] found no significant differences between RS-RALRP and S-RALRP in expanded prostate cancer index (EPIC-CP) sexual function scores or potency at 12 months postoperatively. In this present study sexual function results are not shown, because almost all of the patients presented with erectile dysfunction; or medical problems before surgery.

Conclusion

The RS-RALRP is a true minimally invasive surgery because this technique preserves almost all important anatomical structures that play a role in male continence recovery and sexual function. RS-RALRP has the potential to become the new gold standard for prostate cancer treatment, with improved early continence; and equivalent oncologic efficacy as S-RALRP, which can reduce diaper costs per day and psychosocial problems. However, randomized research and meta-analysis with long-term follow-up oncologic outcomes in RS-RALRP are required.

Conflict of interest

There are no potential conflicts of interest to declare.

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